Phenomenon of Precrystallization of C24 Normal Alkane Confined in Porous Glass

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The heat capacity of C24 normal alkane in bulk and confined in 1000 Å and in 100 Å porous glass matrices has been measured by the high-resolution adiabatic calorimeter. C24 in bulk measured on cooling manifests the following sequence of phases: Isotropic liquid - Rotator phases R_{II} - R_{Y} - Crystal. It has been established that these phases are complex layered structures with in-layer order similar to that observed in highly ordered smectics.

Porous glass matrices strongly modify thermodynamic properties of normal alkane. Phase transitions of isotropic liquid - Rotator phase R_{II} - Crystal for C24 confined in 1000 Å and in 100 Å porous glass matrices ware observed. At the same time we did not observe phase transitions of the Rotator phase R_{II} - R_{I} - R_{I} - R_{I} - R_{I} - R_{I} or this substance.

Jumps in enthalpy related to layer-by-layer crystallization have been observed in 1000 Å matrix. The first jump is connected with the formation of a crystalline monolayer on the glass surface. The next jump corresponds to formation of eight crystal layers in a narrow temperature region (about 0.1°C). The last jump corresponds to the ultimate transition to the Rotator phase. Earlier the formation of a crystalline monolayer on the free surface of liquid n-alkanes was revealed. A similar behavior of enthalpy was observed for C24 confined in a 100°C glass matrix. However, the observed jumps can not be interpreted so clearly as the jumps for the 1000 Å glass matrix.